

Initially, with respect to the objection of claims 4-18 as being in improper form; claims 4 and 7 have been amended to depend from independent claim 1, claim 11 has been rewritten as an independent claim and claims 13 and 17 have been amended to avoid improper multiple dependency. In addition, claim 8 has been amended to remove reference to "Bluetooth"; and new claim 19 has been added to depend from claim 17 to avoid possibly confusing language in original claim 17.

All the claims are now believed to be in proper form throughout, and withdrawal of the objections thereto are respectfully requested.

Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Korisch (U.S. Patent No. 5,926,139). Applicants have carefully considered Korisch and the Examiner's comments with respect thereto; but sincerely believe the claims patentably distinguish over the reference and are allowable in their present form.

Conventionally, an antenna for short-range supplementary communication in a second frequency band (a second antenna), such as in a Bluetooth system, is implemented as a separate unit which is located on the secondary side of the main printed circuit board inside the mobile telephone and well separated from the cellular antenna (the first antenna). However, as mobile telephones become smaller and smaller in size, the available printed circuit board area also decreases. Cellular radio circuitry must be prioritized in the layout of the printed circuit board; and, as a result, in existing telephones, the Bluetooth antenna (second antenna) has been placed in areas on the keyboard side of the printed circuit board, where the performance in a talking position is not very good.

Furthermore, if the Bluetooth antenna is positioned too close to the cellular antenna on the printed circuit board, separate filtering components must be provided in order to isolate the cellular antenna from the

Bluetooth antenna so as to avoid interference. This adds additional cost and complexity to the antenna device (these inadequacies of the prior art are discussed on page 2, lines 18-35 of the present specification).

An object of the present invention is to provide an antenna device for a mobile telephone that provides excellent performance, both for a multi-band cellular antenna (first antenna) and a short-range supplementary communication antenna (second antenna). Additionally, the desired solution, according to a further object of the invention, is one in which interference between the two antennas is avoided without a major cost penalty, and which allows for low cost development and production of antenna components.

The above objects have been achieved by an antenna device according to claim 1, where first and second antennas are formed on a common support element, e.g., on the same mechanical carrier.

The present invention as recited in the claims is quite different from the cited reference. In particular, the antenna in Korisch is a dual-band branch PIFA antenna which is substantially different from a branch printed monopole antenna (first antenna). Also, the Korisch patent does not mention anything about a second, short-range supplementary communication antenna as is required in claim 1. What appears to be disclosed in Korisch is one antenna capable of transmission in two frequency bands. The antenna in Korisch, accordingly, may correspond to the first antenna of the present invention. However, even if this were the case, there are important differences between the multi-band antenna in the present invention and the antenna in Korisch. In any event, there is absolutely no disclosure in Korisch about a second antenna, or the suitability of providing first and second antennas on a common support element. Accordingly, Korisch does not and cannot anticipate claim 1, and claim 1 should be allowable thereover in its present form.

The remaining documents cited by the Examiner are also not relevant to the present invention inasmuch as they similarly do not appear to disclose or suggest a second antenna. Furthermore, as indicated above, the first antenna of the present invention is not a PIFA antenna.

Claims 2-10 depend from and further restrict claim 1 and should also now be allowable.

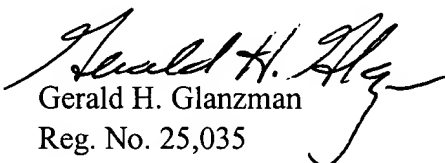
Claim 11 has been rewritten as an independent claim directed to a portable telecommunication apparatus, and includes limitations similar to those recited in claim 1. Claim 11, accordingly, should also be allowable in its present form for substantially the same reasons as discussed above. Claims 12-19 depend from and further restrict claim 11 and should also be allowable.

For all the above reasons, claims 1-19 are believed to patentably distinguish over the cited references and to be allowable in their present form. This application is, accordingly, now believed to be in condition for allowance, and it is respectfully requested that the Examiner so find and issue a Notice of Allowance in due course.

A marked up copy of the amended claims is attached hereto as EXHIBIT A, and a clean copy of all the claims currently in the case is attached hereto as EXHIBIT B.

Respectfully submitted,

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EXHIBIT A

MARKED UP CLAIMS SHOWING AMENDMENTS:

4. (Amended) An antenna device as in claim 1 [2 or 3], where the first antenna (21) comprises a first feeding point (41) and the second antenna (22) comprises a second feeding point (39), the first and second feeding points being electrically isolated from each other.

7. (Amended) An antenna device as in [any of claims] claim 1 [4-6], where the first antenna (21) is a monopole antenna.

8. (Amended) An antenna device as in claim 6, where the second antenna (22) is adapted for [Bluetooth®] communication in a 2.4 GHz frequency band.

11. (Amended) A portable telecommunication apparatus (1), [characterized by an antenna device as defined in any of claims 1-10] said portable telecommunication apparatus including an antenna device (10) having a first antenna (21) adapted for telecommunication in at least a first frequency band, and a second antenna (22) adapted for short-range supplementary communication in a second frequency band, characterized in that the first and second antennas (21, 22) are formed on a common support element (26, 27).

13. (Amended) A portable telecommunication apparatus as in claim 12, [the antenna device being defined by claim 5,] wherein the first antenna (21) comprises a first feeding point (41) and the second antenna (22) comprises a second feeding point (39), the first and second feeding points being electrically isolated from each other; wherein the second antenna (22) comprises a grounding point (40) positioned in proximity with the second feeding point (39); and wherein the antenna connector (28) [has] includes:

a first resilient contact pin (31) adapted to engage with the first feeding point (41) of the first antenna (21),
a second resilient contact pin (29) adapted to engage with the second feeding point (39) of the second antenna (22), and
a third resilient contact pin (30) adapted to engage with the grounding point (40) of the second antenna (22).

17. (Amended) A portable telecommunication apparatus as in [any of] claim[s] 11[-16], where the apparatus is a radio telephone (1)[, preferably a mobile telephone].

EXHIBIT B

CLEAN COPY OF ALL CLAIMS IN CASE

1. An antenna device (10) having a first antenna (21) adapted for telecommunication in at least a first frequency band and a second antenna (22) adapted for short-range supplementary communication in a second frequency band, characterized in that the first and second antennas (21, 22) are formed on a common support element (26, 27).
2. An antenna device as in claim 1, where the first and second antennas (21, 22) are formed as printed traces of conductive material on said support element (26, 27).
3. An antenna device as in claim 1 or 2, where said support element comprises a flexible dielectric film.
4. (Amended) An antenna device as in claim 1, where the first antenna (21) comprises a first feeding point (41) and the second antenna (22) comprises a second feeding point (39), the first and second feeding points being electrically isolated from each other.
5. An antenna device as in claim 4, where the second antenna (22) comprises a grounding point (40) positioned in proximity with the second feeding point (39).

6. An antenna device as in claim 5, where the second antenna (22) is a planar inverted F-type antenna (PIFA).
7. (Amended) An antenna device as in claim 1, where the first antenna (21) is a monopole antenna.
8. (Amended) An antenna device as in claim 6, where the second antenna (22) is adapted for communication in a 2.4 GHz frequency band.
9. An antenna device as in claim 7, where the first antenna (21) is a multi-band antenna.
10. An antenna device as in claim 9, where the first antenna (21) is adapted for communication in a 900 MHz frequency band and at least one of an 1800 MHz frequency band and a 1900 MHz frequency band.
11. (Amended) A portable telecommunication apparatus (1), said portable telecommunication apparatus including an antenna device (10) having a first antenna (21) adapted for telecommunication in at least a first frequency band, and a second antenna (22) adapted for short-range supplementary communication in a second frequency band, characterized in that the first and second antennas (21, 22) are formed on a common support element (26, 27).

12. A portable telecommunication apparatus as in claim 11, further comprising a printed circuit board (33) with radio circuitry (23, 24) mounted thereon, and an antenna connector (28) adapted to provide electric contact between the first and second antennas (21, 22) and said radio circuitry (23, 24).

13. (Amended) A portable telecommunication apparatus as in claim 12, wherein the first antenna (21) comprises a first feeding point (41) and the second antenna (22) comprises a second feeding point (39), the first and second feeding points being electrically isolated from each other; wherein the second antenna (22) comprises a grounding point (40) positioned in proximity with the second feeding point (39); and wherein the antenna connector (28) includes:

a first resilient contact pin (31) adapted to engage with the first feeding point (41) of the first antenna (21),

a second resilient contact pin (29) adapted to engage with the second feeding point (39) of the second antenna (22), and

a third resilient contact pin (30) adapted to engage with the grounding point (40) of the second antenna (22).

14. A portable telecommunication apparatus as in claim 13, wherein the first, second and third resilient contact pins (31, 29, 30) are pogo pins.

15. A portable telecommunication apparatus as in claim 13, wherein the first, second and third resilient contact pins (31, 29, 30) are spring ledges.

16. A portable telecommunication apparatus as in any of claims 11-15, where the antenna device (10) is contained in a plastic or rubber antenna housing (42), which is attached to an upper rear portion of the portable telecommunication apparatus.

17. (Amended) A portable telecommunication apparatus as in claim 11, where the apparatus is a radio telephone (1).

18. A portable telecommunication apparatus as in claim 17, where the apparatus is adapted for use in a GSM, UMTS or D-AMPS mobile telecommunications network.

19. A portable telecommunication apparatus as in claim 17, wherein said radio telephone (1) comprises a mobile telephone.